07 24 02. AF/3746

13DV-13349
PATENT

#19 Appeal Brief 7-30-02 M.P.B.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Hook et al.

Serial No.: 09/545,554

Filed: April 7, 2000

For: METHODS AND APPARATUS FOR REDUCING GAS TURBINE ENGINE EMISSIONS

Art Unit: 3746

Examiner: T. Kim

CERTIFICATE OF MAILING BY EXPRESS MAIL TO THE COMMISSIONER OF PATENTS AND TRADEMARKS

Box AF
Commissioner for Patents
Washington, D.C. 20231

Express Mail Mailing Label No.: EL817714586US
Date of Mailing: July 22, 2002

I hereby certify that the documents listed below:

- Transmittal Letter Accompanying Appeal Brief (2 pages, in triplicate)
- Appellant's Brief (51 pages, in triplicate)
- Appendix of Claims Involved in the Appeal (6 pages, in triplicate)
- Fee Transmittal (1 page, in duplicate)
- Return Postcard

are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above in an envelope addressed to the Commissioner for Patents, Box AF, Washington, D.C. 20231.

Respectfully submitted,

Robert B. Reeser III
Reg. No. 45,548
Armstrong Teasdale LLP
One Metropolitan Square, Suite 2600
St. Louis, MO 63012
(314) 621-5070

Express Mail No. EL817714586US

PTO/SB/17 (10/01)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office: US DEPARTMENT OF COMMERCE
Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

FEE TRANSMITTAL for FY 2002

Fee entitlees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT	($) 320.00

Complete If Known	
Application Number	09/545,554
Filing Date	April 7, 2000
First Named Inventor	Hook, et al.
Group Art Unit	3746
Examiner Name	T. Kim
Attorney Docket Number	13DV-13349

METHOD OF PAYMENT (check one)

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number: 01-2384

Deposit Account Name:

☒ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

☐ Applicant claims small entity status. See 37 CFR 1.27

2. ☐ **Payment Enclosed:**

☐ Check ☐ Credit Card ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
101	740	201	370	Utility Filing Fee	
106	330	206	165	Design Filing Fee	
107	510	207	255	Plant Filing Fee	
108	740	208	370	Reissue filing Fee	
114	160	214	80	Provisional Filing Fee	

SUBTOTAL (1)

2. EXTRA CLAIM FEES

		Extra Claims		Fee From Below		Fee Paid
Total Claims		-20**	x		=	
Independent Claims		-3*	x		=	
Multiple Dependant			x		=	

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	84	202	42	Independent claims in excess of 3
104	280	204	140	Multiple dependent claim, if not paid
109	84	209	42	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge-late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2520	147	2520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1840*	113	1840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second Month	
117	920	217	460	Extension for reply within third month	
118	1440	218	720	Extension for reply within fourth month	
128	1960	228	980	Extension for reply within fifth month	
119	320	219	160	Notice of Appeal	320.00
120	320	220	160	Filing a brief in support of an appeal	
121	280	221	140	Request for oral hearing	
138	1510	138	1510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive – unavoidable	
141	1280	241	640	Petition to revive – unintentional	
142	1280	242	640	Utility issue fee (or reissue)	
143	460	243	230	Design issue fee	
144	620	244	310	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	740	246	370	Filing a submission after a final rejection (37-CFR 1.129(a))	
149	740	249	370	For each additional invention to be examined (37 CFR 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) 320.00

SUBMITTED BY				Complete (if applicable)	
Name (Print/Type)	Robert B. Reeser III	Registration No. (Attorney/Agent)	45,548	Telephone	(314) 621-5070
Signature				Date	July 22, 2002

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Office, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

13DV-13349
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Hook et al.

Serial No.: 09/545,554

Filed: April 7, 2000

For: METHODS AND APPARATUS FOR REDUCING GAS TURBINE ENGINE EMISSIONS

Art Unit: 3746

Examiner: Kim, T.

TRANSMITTAL LETTER ACCOMPANYING APPEAL BRIEF

Box AF
Commissioner for Patents
Washington, D.C. 20231

Sir:

Transmitted herewith in triplicate is the Appeal Brief in this application. The Commissioner is authorized to charge the $320.00 fee for filing this Appeal Brief, pursuant to 37 CFR 1.17(f), to Deposit Account 01-2384. A duplicate copy of this transmittal letter is submitted for that purpose.

The Notice of Appeal in this Application was mailed on May 21, 2002. As indicated in the enclosed certificate of mailing by express mail, the Appeal Brief is being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service (Express Mail Label No. EL817714586US, on July 22, 2002). Since this Appeal Brief is submitted on the first business day following July 21, 2002, no extension of time is required.

We believe that the fee of $320.00 is the correct amount. However, in the event of overpayment or underpayment, please credit any excess or charge any deficiency to Deposit Account No. 01-2384. This transmittal letter is submitted in duplicate for this purpose.

Respectfully submitted,

Robert B. Reeser III
Reg. No. 45,548
ARMSTRONG TEASDALE LLP.
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Hook et al.

Serial No.: 09/545,554

Filed: April 7, 2000

For: METHODS AND APPARATUS FOR REDUCING GAS TURBINE ENGINE EMISSIONS

Art Unit: 3746

Examiner: Kim, T.

APPELLANT'S BRIEF

Box AF
Commissioner for Patents
Washington, D.C. 20231

The Notice of Appeal in this Application was mailed on May 21, 2002. As set forth in the accompanying transmittal letter, this brief is transmitted in triplicate. This brief contains the following sections under the headings and in the order set forth below.

I. Real Party in Interest

II. Related Appeals and Interferences

III. Status of Claims

IV. Status of Amendments

V. Summary of Invention

VI. Issues

VII. Grouping of Claims

VIII. Argument

Appendix A. Claims Involved in the Appeal

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is General Electric Company, Schenectady, New York, 12345.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences which will directly affect, or be directly affected by, or have a bearing on, the decision in this pending appeal.

III. STATUS OF CLAIMS

Nineteen (19) claims, in total, are in this application. Claims 1-6, and 8-20 are pending. Claims 1-6 and 8-20 stand rejected. Claim 7 has been canceled. Claims 1-6 and 8-20 are on appeal.

IV. STATUS OF AMENDMENTS

A Final Office Action was issued February 21, 2002, by the Examiner in response to a Request for Continued Examination filed on October 31, 2001. An Advisory Action issued April 9, 2002, by the Examiner in response to a Request for Reconsideration filed with the Request for Continued Examination, indicates that Claims 1-6 and 8-20 stand rejected.

V. SUMMARY OF THE INVENTION

The following summary does not limit, in any manner, the claim interpretation. Rather, the following summary is provided only to facilitate the Board's understanding of the subject matter of this appeal. The present invention relates a gas turbine engine (10) including a combustor system which reduces an amount of nitrous oxide emissions formed by the gas turbine engine (10), and thus, overcomes shortcomings associated with at least some known gas turbine engines. The combustor system includes a combustor (16) and a water delivery system (130). The combustor (16) is a lean premix combustor that includes a plurality of premixers (104, 108, 112), and is operable with a fuel/air mixture equivalence ration that is less than one. The water delivery system (130) supplies at least one of water and steam to the gas turbine engine (10) such that the water or steam is injected to the combustor (16).

During normal gas turbine engine operations, fuel is supplied proportionally with airflow to the combustor (16) such that the combustor (16) operates with a fuel/air mixture equivalence ratio less than one. As the gas turbine engine operating speed increases, additional fuel and air are supplied to the combustor (16) and the water delivery system (130) also supplies either water or steam to the combustor (16). An increase in combustion zone flame temperatures generated as a

result of additional fuel being burned within the combustor (16) is minimized by the water or steam supplied to the combustor (16). As a result, nitrous oxide emissions generated within the combustor (16) are reduced. Alternatively, the gas turbine engine (10) may achieve an increased operating power level for a specified nitrous oxide emission level.

More specifically, the invention is defined claim-by-claim as set forth below.

Independent Claim 1 recites a method for operating a gas turbine combustor (16) of a gas turbine engine (10) using a water delivery system (130), the combustor (10) including a plurality of domes (58, 64, 70), the water delivery system (130) connected to the gas turbine engine (10), said method comprising the steps of:

supplying at least one combustor dome (58, 64, 70)a fuel/air mixture equivalence ratio less than one; and

supplying at least one of water and steam into the gas turbine engine (10) with the water delivery system (130) such that at least one of water and steam is injected into the combustor (16). See specification at page 3, lines 12-15, page 3, line 25 through page 4, line 4, at page 4, line 24 through page 6, line 11, and at page 6, line 12 through page 7, line 12.

Claim 2 depends from Claim 1 and further recites said step of supplying at least one of water and steam further comprising

the step of supplying at least one of water and steam to at least one of the plurality of domes (58, 64, 70). See specification at page 5, line 3 through page 5, line 8, and at page 6, line 12 through page 7, line 12.

Claim 3 depends from Claim 1 and further recites that the combustor (16) includes a first dome (58), a second dome (64), and a third dome (70), the second dome (64) disposed radially inward from the first dome (58) and the third dome (70), wherein said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam to the combustor second dome (64). See specification at page 4, lines 5-16, at page 5, line 9 through page 6, line 4, and at page 6, line 18 through page 7, line 12.

Claim 4 depends from Claim 1 and further recites the combustor (16) includes at least one dual fuel nozzle (134), said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam to the combustor (16) through at least one dual fuel nozzle (134). See specification at page 4, line 24, through page 5, line 2.

Claim 5 depends from Claim 1 and further recites the gas turbine engine (10) has a rated engine operating capability, said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam

to the gas turbine engine (10) when the engine (10) is operating at an operating speed greater than approximately 90 percent rated engine power capability. See specification at page 5, line 14 through page 6, line 4, and at page 6, line 18 through page 7, line 12.

Independent Claim 6 recites a combustor system for a gas turbine engine (10), said combustor system comprising: a combustor (16) comprising a plurality of domes (58, 64, 70), at least one of said combustor domes (58, 64, 70) configured to operate with a fuel/air mixture equivalence ratio less than one; and a water delivery sub-system (130) connected to the gas turbine engine (10) and configured to supply at least one of water and steam to the gas turbine (10) such that at least one of water and steam is injected into the combustor (16). See specification at page 2, lines 12-15, page 3, line 25 through page 4, line 4, at page 4, line 24 through page 6, line 11, and at page 6, line 12 through page 7, line 12.

Claim 8 depends from Claim 6 and further recites said water delivery sub-system (130) further configured to supply at least one of water and steam to at least one dome (58, 64, 70), of said combustor (16). See specification at page 5, line 3 through page 5, line 8, and at page 6, line 12 through page 7, line 12.

Claim 9 depends from Claim 8 and further recites said combustor (16) further comprises at least one dual fuel nozzle

(134), said water delivery sub-system (130) further configured to supply at least one of water and steam to said combustor (16) through at least one dual fuel nozzle (134). See specification at page 4, line 24, through page 5, line 2.

Claim 10 depends from Claim 8 and further recites said combustor (16) further comprises at least one premixer (104, 108, 112) in flow communication with said water delivery sub-system (130). See specification at page 4, lines 17-29.

Claim 11 depends from Claim 6 and further recites said combustor (16) comprises a first dome (58), a second dome (64), and a third dome (70), said second dome (64) disposed between said first and third domes (58,70), said water delivery sub-system (130) further configured to supply at least one of water and steam to said combustor second dome (64). See specification at page 4, lines 5-16, at page 5, line 9 through page 6, line 4, and at page 6, line 18 through page 7, line 12.

Claim 12 depends from Claim 6 and further recites said water delivery sub-system (130) selectively operable in a first mode and a second mode, said water delivery sub-system further configured to supply water to said combustor at a first flow rate when in the first operating mode, said water delivery sub-system (130) further configured to supply water to said combustor (16) at a higher flow rate when in the second operating mode. See specification at page 6, lines 12-24.

Claim 13 depends from Claim 12 and further recites the engine (10) has a rated engine power, said water delivery sub-system (130) is further configured to supply water in the first operating mode when the gas turbine engine (10) operates below a predefined percentage of the rated engine power and supply water in the second operating mode when the gas turbine engine (10) operates above the predefined percentage of the rated engine power. See specification at page 6, lines 12-24.

Independent Claim 14 recites a gas turbine engine (10) comprising a combustor system comprising a combustor (16) and a water delivery sub-system (130), said combustor (16) being a lean premix combustor comprising a plurality of domes (58, 64, 70), at least one of said domes (58, 64, 70) configured to operate with a fuel/air mixture equivalence ratio less than one, said water delivery sub-system (130) configured to supply at least one of water and steam to the gas turbine engine (10) such that at least one of water and steam is injected into the combustor (16). See specification at page 2, lines 12-15, page 3, line 25 through page 4, line 4, at page 4, line 24 through page 6, line 11, and at page 6, line 12 through page 7, line 12.

Claim 15 depends from Claim 14 and further recites said combustor (16) comprises at least one premixer (104, 108, 112), said water delivery sub-system (130) further configured to supply at least one of water and steam to at least one premixer (104,

108, 112) of said combustor. See specification at page 4, lines 19-29.

Claim 16 depends from Claim 14 and further recites said water delivery sub-system (130) further configured to supply at least one of water and steam to at least one dome (58, 64, 70) of said combustor (16). See specification at page 4, lines 5-16, at page 5, line 9 through page 6, line 4, and at page 6, line 18 through page 7, line 12.

Claim 17 depends from Claim 16 and further recites said combustor (16) further comprises a first dome (58), a second dome (64), and a third dome (70), said second dome (58) disposed between said first and third domes (58, 70), said water delivery sub-system (130) further configured to supply at least one of water and steam to said combustor second dome (58). See specification at page 4, lines 5-16, at page 5, line 9 through page 6, line 4, and at page 6, line 18 through page 7, line 12.

Claim 18 depends from Claim 14 and further recites said water delivery sub-system (130) selectively operable in a first mode and a second mode, said water delivery sub-system (130) further configured to supply water to said combustor (16) at a first flow rate when in the first operating mode, said water delivery sub-system (130) further configured to supply water to said combustor (16) at a higher flow rate when in the second operating mode. See specification at page 6, lines 12-24.

Claim 19 depends from Claim 18 and further recites said gas turbine engine (10) has a rated engine power capability, said water delivery sub-system (130) further configured to supply water in the first operating mode when the gas turbine engine (10) operates below a predefined percentage of the rated engine power and supply water in the second operating mode when the gas turbine engine (10) operates above the predefined percentage of the rated engine power. See specification at page 6, lines 12-24.

Claim 20 depends from Claim 19 and further recites said water delivery sub-system (130) further configured to supply water in the second operating mode when said gas turbine engine (10) is operating at an operating speed greater than approximately 90 percent rated engine power capability. See specification at page 6, lines 12-24.

VI. ISSUES

A. Whether Claims 1-4, 6, 8-11, and 15-17 are unpatentable under 35 U.S.C. § 103 over Schilling et al. (U.S. Patent No. 5,630,319) in view of either Horner et al. (U.S. Patent No. 5,274,995) or Borkowicz et al. (U.S. Patent No. 5,259,184).

B. Whether Claims 5, 12-14, and 18-20 are unpatentable under 35 U.S.C. § 103 over Schilling et al. (U.S. Patent No. 5,630,319) in view of either Horner et al. (U.S. Patent No.

5,274,995) or Borkowicz et al. (U.S. Patent No. 5,259,184), and further in view of Talabisco et al. (U.S. Patent No. 5,357,741) or Maslak (U.S. Patent No. 4,928,478).

VII. GROUPING OF CLAIMS

All rejected claims (i.e., Claims 1-6 and 8-20) do not stand or fall together as discussed below in detail. Claims 1-5 stand and fall together. Claims 6 and 8-13 stand and fall together. Claims 14-20 stand and fall together.

VIII. ARGUMENT

Applicants respectfully submit that each pending claim in the present application is patentable over the cited art. Accordingly, Applicants respectfully traverse the rejection of the pending claims, and requests that the final rejection be withdrawn and that the pending claims be allowed. In support of these requests, a background discussion of the claims is provided below. Also, a discussion regarding the patentability of the claimed recitations is set forth below.

A Background

The present invention is directed to overcoming shortcomings associated with known gas turbine engines and methods used for reducing nitrous oxide emissions.

Gas turbine engines typically include a compressor for compressing a working fluid, such as air. The compressed air is injected into a combustor which heats the fluid causing it to expand, and the expanded fluid is forced through a turbine. The compressor typically includes a low pressure compressor and a high pressure compressor.

The output of at least some known gas turbine engines may be limited by the amount of emissions generated by the engine during operation. More specifically, nitrous oxide is formed within a gas turbine engine as a result of high combustor flame temperatures. However, in at least some known gas turbine engines, making modifications to the gas turbine engine in an effort to reduce nitrous oxide emissions often has an adverse effect on operating performance levels of the associated gas turbine engine.

To reduce nitrous oxide emissions generated within a gas turbine engine, it is known to increase the airflow through the gas turbine combustor during operating conditions. However, gas turbine engines include preset operating parameters, such as turbine nozzle cooling parameters, and any airflow increases are limited by the preset operating parameters.

Additionally, because gas turbine engine modifications are labor-intensive and time-consuming, users are often

limited to derating the operating power capability of the gas turbine engine to prevent the engine from operating at full capacity. However, such derates do not limit an amount of nitrous oxide formed as the engine operates, but rather limit the operating capacity of the gas turbine engine.

Against this background, the present invention was created, and a gas turbine engine including a multi-domed combustor that is operable with water injection and a fuel/air mixture equivalence ratio less than one was provided that overcomes the above-mentioned disadvantages.

B The Apparatus Recited In Claims 1-4, 6, 8-11, and 15-17 Is Nonobvious Over Schilling et al. (U.S. Patent No. 5,630,319) in view of either Horner et al. (U.S. Patent No. 5,274,995) or Borkowicz et al. (U.S. Patent No. 5,259,184).

The following discussion sets forth the Section 103 rejections cited against the pending claims and summarizes current and applicable law with respect to obviousness. In addition, a discussion of the rejection with respect to each pending claim, in view of current and applicable law, is provided. A claim-by-claim analysis of the pending claims also is set forth.

1. The Cited Rejections

In rejecting Claims 1-4, 6, 8-11, and 15-17, three patents were cited for the combination in the February

21, 2002, Office Action. More specifically, Claims 1-4, 6, 8-11, and 15-17 were rejected under 35 U.S.C. § 103 as being anticipated by Schilling et al. (U.S. Patent No. 5,630,319) in view of either Horner et al. (U.S. Patent No. 5,274,995) or Borkowicz et al. (U.S. Patent No. 5,259,184). It also appears from the February 21, 2002, Office Action, that Claims 1-4, 6, 8-11, and 15-17 were also rejected under the same combination, in view of Joshi et al. (U.S. Patent No. 5,351,477)

2. Applicable Law With Respect To Obviousness

> Section 103, in pertinent part, provides:
>
> A patent may not be obtained . . .if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

35 U.S.C. § 103. As explained by the Federal Circuit, "to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the

applicant." In re Kotzab, 54 USPQ2d 1308, 1316 (Fed. Cir. 2000).

> Moreover, the Federal Circuit has determined that:
>
> [I]t is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fitch, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992), citing, In re Gordan, 221 USPQ at 1127. Further, under Section 103, "it is impermissible . . .to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 USPQ 391, 393 (CCPA 1965). See also, Smithkline Diagnostics, Inc. v. Helena Laboratories, Corp., 8 USPQ2d 1468, 1475 (Fed. Cir. 1988) ("claims, entire prior art, and prior art patents must be read 'as a whole'"). Also, if art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention.

U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). Furthermore, obvious to try a modification or combination of references is not prima facia obvious. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991).

3. The Section 103 Rejection Of The Present Claims Is Not A Proper Prima Facie Obviousness Rejection

Applicants respectfully submit that the Section 103 rejection of presently pending Claims 1-4, 6, 8-11, and 15-17 as being unpatentable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al. is not a proper rejection.

None of Schilling et al., Horner et al., Borkowicz et al. nor Joshi et al., considered alone or in combination, teach, suggest, or provide any incentive for making the claimed combination. In addition, the

rejection appears to be solely based upon improperly using the specification of the present application as a template, and then improperly picking and choosing various features from the cited patent in an attempt to reconstruct the structures recited in the presently pending claims. Additionally, none of Schilling et al., Horner et al., Borkowicz et al. nor Joshi et al., considered alone or in combination, provide any reasonable expectation of success in such a combination.

Furthermore, Applicants respectfully submit that the prior art teaches away from the present invention and from each other. More specifically, in contrast to the present invention, Borkowicz et al. and Horner et al. each describe combustors that utilize optional water injection, but do not describe combustors that are operable with a fuel/air ratio less than one. Additionally, Borkowicz et al. and Horner et al. are each clearly in contrast with Joshi et al. which specifically teaches away from using water/steam injection at column 1, lines 27-31. Furthermore, at column 1, lines 56-59, Joshi et al. further teach away from Borkowicz et al. by describing that "premixing

ducts in the prior art have been found to be unsatisfactory due to flashback and auto-ignition considerations for modern gas turbine applications." As such, Applicants respectfully submit that Joshi et al. is not properly combinable with, or modifiable with, either Horner et al. or Borkowicz et al.

Furthermore, Schilling et al. also teaches away from the prior art and the present invention by describing a dome assembly for a combustor, but does not describe nor suggest that the combustor is operable with a fuel/air ratio less than one, or with water injection. Accordingly, Applicants respectfully submit that because the prior art teaches away from each other, as well as from the current invention, that there is no suggestion or motivation to combine Schilling et al. with either Horner et al. or Borkowicz et al. or with Joshi et al.

Furthermore, since there is no teaching nor suggestion in the cited art for the claimed combination, Applicants submit the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the

present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection of Claims 1-4, 6, 8-11, and 15-17 be withdrawn.

In addition, it is asserted in the Office Action that:

> [i]t would have been obvious to one of ordinary skill to employ water/steam injection with the premixers of Schilling et al., in order to facilitate low emissions.

February 21, 2002, Office Action, page 3. The failure to cite prior art that teaches or suggests the claimed subject matter cannot be overcome by the mere assertion of obviousness.

More specifically, the mere assertion that this structure is well within the level of one of ordinary skill of the art at the time the invention was made does not support a prima facie obviousness rejection. Rather, each allegation of what is within the level of one of ordinary skill of the art must always be supported by citation to some reference work recognized as standard in the pertinent art and the Applicants given the opportunity to challenge the correctness of the assertion or the notoriety or repute of the cited reference. Applicants have not been provided with the citation to any reference supporting the combination

made in the rejection. The Office Action, therefore, fails to provide Applicants with a fair opportunity to respond to the rejection, and fails to provide Applicants with the opportunity to challenge the correctness of the rejection. Thus, for at least the reasons set forth above, the rejection of Claims 1-4, 6, 8-11, and 15-17,as unpatentable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al. is submitted to be improper.

4. The Structures Recited In Claims 1-4, 6, 8-11, and 15-17, Are Nonobvious With Respect to Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Applicants respectfully submit that each pending claim in the present application recites structures which are nonobvious with respect to the cited art.

Schilling et al. describe a multiple annular combustion apparatus 25 that includes a domed end 35 including a plurality of domes 37, 39, and 41. Each dome 37, 39, and 41 includes a plurality of spaced openings that receive mixers for mixing air and fuel prior to entry into a common combustion chamber 29. Notably, Schilling et al. do not describe nor suggest water injection into domes 37, 39, and 41.

Furthermore, Schilling et al. do not describe nor suggest operating combustion apparatus 25 with a fuel/air ratio less than one, or to facilitate reducing an amount of emissions emitted from apparatus 25. Rather, at column 4, lines 60-62, Schilling et al. describe that additional cooling air supplied to combustion apparatus 25 "exits downstream of the primary combustion zones 61, 63, and 65, and therefore does not affect the NO_x produced therein."

Horner et al. describe a continuous-burning combustor 10 for use with a gas turbine engine. Combustor 10 includes a single dome assembly 22 that includes a swirl cup 28, a dome plate 32, and a swirler 38. Swirler 38 receives a fuel nozzle 26 therethrough that supplies fuel and water to a combustion chamber 14 defined within combustor 10. Notably, Horner et al. do not describe nor suggest operating combustor 10 with a combustor fuel/air mixture equivalence ratio less than one. Furthermore, Horner et al. also describe, for example, at column 2, lines 18-21, problems associated with water injection, and further recite at column 1, lines 33-47, that one object of the invention "is to provide an improved combustor dome assembly design

which may improve CO and NO_x emission performance with or without water injection."

Borkowicz et al. describe a gas turbine 10 that includes a plurality of combustors 14 that extend circumferentially within gas turbine 10. Each combustor 14 includes a single dome, a combustion chamber 70, and a plurality of fuel nozzles 32 arranged about a longitudinal axis of combustor 14. Each combustor fuel chamber 70 is downstream from, and in flow communication with, the dome. Each fuel nozzle 32 includes a premix passage 60 and a diffusion passage 74. Premix passage 60 is in flow communication with a plurality of premix fuel distribution tubes 66. Notably, Borkowicz et al. do not describe nor suggest that combustor 14 is operable with a fuel/air mixture equivalence ratio less than one. Furthermore, Borkowicz et al. describe that water injection is optional because the multiple premixing sections or tubes allow a thorough premixing of fuel and air prior to burning, which, as described at column 2, line 36, "ultimately results in low NO_x levels."

Joshi et al. describe a duel fuel mixer 24 for use with a single domed combustor 10. Mixer 24 includes a swirl cup 22 and inner and outer swirlers 26 and 28,

respectively. Mixer 24 is in flow communication with gas fuel passages 38 and a liquid fuel manifold 40. Notably, Joshi et al. do not describe nor suggest injecting water into combustor 10, but rather at column 1, lines 27-31, Joshi et al. recite that although "the wet techniques (water/steam injection) and selective catalytic reduction have proven themselves in the field, both of these techniques require extensive use of ancillary equipment...[which] drives the cost of energy production higher." Furthermore, at column 1, lines 56-59, Joshi et al. describe that the "premixing ducts of the prior art have been found to be unsatisfactory due to flashback and auto-ignition considerations for modern gas turbine applications."

Independent Claim 1 recites a method for operating a gas turbine combustor using a water delivery system, the combustor including a plurality of domes, the water delivery system is connected to the gas turbine engine, and the method comprising the steps of "operating the gas turbine engine with a combustor including a plurality of domes and with a combustor fuel/air mixture equivalence ratio less than one...supplying at least one of water and steam into the gas turbine engine with the water delivery system...."

None of Schilling et al., Horner et al., Borkowicz et al., or Joshi et al., considered alone or in combination, describe or suggest a method for operating a gas turbine combustor using a water delivery system, wherein the combustor includes a plurality of domes, and wherein the water delivery system is connected to the gas turbine engine, in combination with method steps of operating the gas turbine engine with a combustor that includes a plurality of domes and with a combustor fuel/air mixture equivalence ratio less than one, and supplying at least one of water and steam into the gas turbine engine with the water delivery system. Specifically, none of Schilling et al., Horner et al., nor Borkowicz et al., considered alone or in combination, describe or suggest operating a combustor with a fuel/air mixture equivalence ratio less than one, and when Schilling et al., Horner et al., and Borkowicz et al., are considered in combination with Joshi et al., none of Schilling et al., Horner et al., Borkowicz et al., nor Joshi et al., describe or suggest water injection in a combustor that is operable with a fuel/air mixture equivalence ratio less than one. Furthermore, Joshi et al. teach away from Horner et al. and Borkowicz et al. by describing a combustor that is

specifically not operable with water injection. Accordingly, Applicants respectfully submit that Claim 1 is patentable over Schilling et al. in view of Horner et al. or Borkowicz et al. and further in view of Joshi et al.

Claim 2 depends from independent Claim 1 and further recites that the step of supplying at least one of water and steam further comprises the step of "supplying at least one of water and steam to at least one of the plurality of domes." Applicants submit that when this structure is considered in combination with the structure recited in Claim 1, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 2 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 3 depends from independent Claim 1 and further recites that the combustor includes a first dome, a second dome, and a third dome, and that the second dome is disposed radially inward from the first dome and the third dome, and further recites that the

step of supplying at least one of water and steam further comprises the step of "supplying at least one of water and steam to the combustor second dome." Applicants submit that when this structure is considered in combination with the structure recited in Claim 1, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 2 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 4 depends from Claim 1 and further recites that the combustor includes at least one dual fuel nozzle, and that the step of supplying at least one of water and steam further comprises the step of "supplying at least one of water and steam to the combustor through at least one dual fuel nozzle." Applicants submit that when this structure is considered in combination with the structure recited in Claim 1, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and

accordingly, Applicants submit that dependent Claim 4 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Independent Claim 6 recites a combustor system for a gas turbine engine, wherein the combustor system comprises "a combustor comprising a plurality of domes, at least one of said combustor domes configured to operate with a fuel/air mixture equivalence ratio less than one...water delivery sub-system connected to the gas turbine engine and configured to supply at least one of water and steam to the gas turbine such that at least one of water and steam is injected into the combustor."

None of Schilling et al., Horner et al., Borkowicz et al., or Joshi et al., considered alone or in combination, describe nor suggest a combustor system for a gas turbine engine, wherein the combustor system includes a combustor including a plurality of domes, wherein at least one of the combustor domes is configured to operate with a fuel/air mixture equivalence ratio less than one, in combination a water delivery sub-system connected to the gas turbine engine

and configured to supply at least one of water and steam to the gas turbine such that at least one of water and steam is injected into the combustor. Specifically, none of Schilling et al., Horner et al., nor Borkowicz et al., considered alone or in combination, describe or suggest a combustor system for a gas turbine engine including a combustor dome that is configured to operate with a fuel/air mixture equivalence ratio less than one, and when Schilling et al., Horner et al., and Borkowicz et al., are considered in combination with Joshi et al., none of Schilling et al., Horner et al., Borkowicz et al., nor Joshi et al., describe or suggest water injection in a combustor that is operable with a fuel/air mixture equivalence ratio less than one. Furthermore, Joshi et al. teach away from Horner et al. and Borkowicz et al. by describing a combustor that is specifically not operable with water injection. Accordingly, Applicants respectfully submit that Claim 6 is patentable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 8 depends from independent Claim 6 and further recites "said water delivery sub-system further

configured to supply at least one of water and steam to at least one dome, of said combustor. Applicants submit that when this structure is considered in combination with the structure recited in Claim 6, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 8 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 9 depends from Claim 8 and further recites "said combustor further comprises at least one dual fuel nozzle, said water delivery sub-system further configured to supply at least one of water and steam to said combustor through at least one dual fuel nozzle. Applicants submit that when this structure is considered in combination with the structure recited in Claim 6, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 9 is patentably distinguishable over Schilling et al. in

view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 10 depends from Claim 8 and further recites "said combustor further comprises at least one premixer in flow communication with said water delivery sub-system. Applicants submit that when this structure is considered in combination with the structure recited in Claims 6 and 8, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 10 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 11 depends from Claim 6 and further recites "said combustor comprises a first dome, a second dome, and a third dome, said second dome disposed between said first and third domes, said water delivery sub-system further configured to supply at least one of water and steam to said combustor second dome." Applicants submit that when this structure is considered in combination with the structure recited in Claim 6, the structure is not taught nor suggested by

Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 11 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 15 depends from independent Claim 14 which recites a gas turbine engine comprising a combustor system comprising a combustor and a water delivery sub-system...said combustor being a lean premix combustor comprising a plurality of domes...at least one of said domes configured to operate with a fuel/air mixture equivalence ratio less than one...said water delivery sub-system configured to supply at least one of water and steam to the gas turbine engine such that at least one of water and steam is injected into the combustor."

None of Schilling et al., Horner et al., Borkowicz et al., nor Joshi et al., considered alone or in combination, describe or suggest a gas turbine engine including a combustor system including a combustor that includes a combustor and a water delivery sub-system, wherein the combustor includes a plurality of domes such that at least one of the domes is configured to

operate with a fuel/air mixture equivalence ratio less than one, in combination with a water delivery sub-system configured to supply at least one of water and steam to the gas turbine engine such that at least one of water and steam is injected into the combustor. Specifically, none of Schilling et al., Horner et al., nor Borkowicz et al., considered alone or in combination, describe or suggest operating a combustor with a fuel/air mixture equivalence ratio less than one, and when Schilling et al., Horner et al., and Borkowicz et al., are considered in combination with Joshi et al., none of Schilling et al., Horner et al., Borkowicz et al., nor Joshi et al., describe or suggest water injection in a combustor that is operable with a fuel/air mixture equivalence ratio less than one. Furthermore, Joshi et al., teach away from Horner et al. and Borkowicz et al. by describing a combustor that is specifically not operable with water injection. Accordingly, Applicants respectfully submit that Claim 14 is patentable over Schilling et al. in view of Horner et al. or Borkowicz et al. and further in view of Joshi et al.

Claim 15 depends from Claim 14 and further recites "said combustor comprises at least one premixer, said water delivery sub-system further configured to supply at least one of water and steam to at least one premixer of said combustor. Applicants submit that when this structure is considered in combination with the structure recited in Claim 6, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 15 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 16 depends from Claim 14 and further recites "said water delivery sub-system further configured to supply at least one of water and steam to at least one dome of said combustor. Applicants submit that when this structure is considered in combination with the structure recited in Claim 14, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 16 is patentably distinguishable

over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Claim 17 depends from Claim 16 and further recites said combustor further comprises a first dome, a second dome, and a third dome, said second dome disposed between said first and third domes, said water delivery sub-system further configured to supply at least one of water and steam to said combustor second dome. Applicants submit that when this structure is considered in combination with the structure recited in Claim 14, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 17 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Joshi et al.

Accordingly, Applicants respectfully submit that the Section 103 rejection of Claims 1-4, 6, 8-11, and 15-17 should be withdrawn.

C The Apparatus Recited In Claims 5, 12-14, and 18-20 Is Nonobvious Over Schilling et al. (U.S. Patent No. 5,630,319) in view of either Horner et al. (U.S. Patent No. 5,274,995) or Borkowicz et al. (U.S. Patent No. 5,259,184), and further

in view of Talabisco et al. (U.S. Patent No. 5,357,741) or Maslak (U.S. Patent No. 4,928,478).

The following discussion sets forth the Section 103 rejections cited against the pending claims and summarizes current and applicable law with respect to obviousness. In addition, a discussion of the rejection with respect to each pending claim, in view of current and applicable law, is provided. A claim-by-claim analysis of the pending claims also is set forth.

1. The Cited Rejections

In rejecting Claims 5, 12-14, and 18-20, five patents were cited for the combination in the February 21, 2002, Office Action. More specifically, Claims 5, 12-14, and 18-20 were rejected under 35 U.S.C. § 103 as being anticipated by Schilling et al. (U.S. Patent No. 5,630,319) in view of either Horner et al. (U.S. Patent No. 5,274,995) or Borkowicz et al. (U.S. Patent No. 5,259,184), and further in view of Talabisco et al. (U.S. Patent No. 5,357,741) or Maslak (U.S. Patent No. 4,928,478). It also appears from the February 21, 2002, Office Action, that Claims 5, 12-14, and 18-20 were also rejected under the same combination, in view of Joshi et al. (U.S. Patent No. 5,351,477)

2. Applicable Law With Respect To Obviousness

The applicable law with respect to Section 103, is set forth above.

3. The Section 103 Rejection Of The Present Claims Is Not A Proper Prima Facie Obviousness Rejection

Applicants respectfully submit that the Section 103 rejection of presently pending Claims 5, 12-14, and 18-20 as being unpatentable over Schilling et al. in view of Horner et al. or Borkowicz et al., further in view of Talabisco et al. or Maslak, and further in view of Joshi et al. is not a proper rejection.

None of Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., Maslak, nor Joshi et al., considered alone or in combination, teach, suggest, or provide any incentive for making the claimed combination. In addition, the rejection appears to be solely based upon improperly using the specification of the present application as a template, and then improperly picking and choosing various features from the cited patent in an attempt to reconstruct the structures recited in the presently pending claims. Additionally, none of Schilling et al., Horner et al.,

Borkowicz et al., Talabisco et al., Maslak, nor Joshi et al., considered alone or in combination, provide any reasonable expectation of success in such a combination.

Furthermore, Applicants respectfully submit that the prior art teaches away from the present invention and from each other. More specifically, in contrast to the present invention, Borkowicz et al., Horner et al., Talabisco et al., and Maslak each describe combustors that utilize optional water injection, but do not describe combustors that are operable with a fuel/air ratio less than one. Additionally, Borkowicz et al., Horner et al., Talabisco et al., and Maslak are each clearly in contrast with Joshi et al. which specifically teaches away from using water/steam injection at column 1, lines 27-31. Furthermore, at column 1, lines 56-59, Joshi et al. further teach away from Borkowicz et al. by describing that the "premixing ducts of the prior art have been found to be unsatisfactory due to flashback and auto-ignition considerations for modern gas turbine applications." As such, Applicants respectfully submit that Joshi et al. is not properly combinable with, or modifiable

with, any of Horner et al., Borkowicz et al., Talabisco et al., or Maslak. Accordingly, Applicants respectfully submit that because the prior art teaches away from each other, as well as the current invention, that there is no suggestion or motivation to combine any of Horner et al., Borkowicz et al., Talabisco et al., or Maslak with Joshi et al.

Furthermore, Schilling et al. also teaches away from the prior art and the present invention by describing a dome assembly for a combustor, but does not describe nor suggest that the combustor is operable with a fuel/air ratio less than one, or with water injection. Accordingly, Applicants respectfully submit that because the prior art teaches away from each other, as well as from the current invention, that there is no suggestion or motivation to combine Schilling et al. with any of Horner et al., Borkowicz et al., Talabisco et al., Maslak, or Joshi et al. For at least these reasons, Applicants respectfully request that the Section 103 rejection be withdrawn.

In addition, it is asserted in the Office Action that:

> [i]t would have been obvious to one of ordinary skill to control the steam/water injection by using a first and second mode with a predetermined value, as being a notoriously old and well known method utilized in the art. As for the set point being greater than 90 percent of the rated power capability, that is within the ordinary skill in the art, as an obvious matter of finding the workable ranges in the art.

February 21, 2002, Office Action, page 3-4. The failure to cite prior art that teaches or suggests the claimed subject matter cannot be overcome by the mere assertion of obviousness.

More specifically, the mere assertion that this structure is well within the level of one of ordinary skill of the art at the time the invention was made does not support a prima facie obviousness rejection. Rather, each allegation of what is within the level of one of ordinary skill of the art must always be supported by citation to some reference work recognized as standard in the pertinent art and the Applicants given the opportunity to challenge the correctness of the assertion or the notoriety or repute of the cited reference. Applicants have not been provided with the citation to any reference supporting the combination made in the rejection. The Office Action, therefore, fails to provide Applicants with a fair opportunity to respond to the rejection, and fails to provide Applicants with the opportunity to challenge the

correctness of the rejection. Thus, for at least the reasons set forth above, the rejection of Claims 5, 12=14, and 18-20,as unpatentable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al. is submitted to be improper.

4. The Structures Recited In Claims 5, 12-14, and 18-20, Are Nonobvious With Respect to Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al., or Maslak, and Joshi et al.

Applicants respectfully submit that each pending claim in the present application recites structures which are nonobvious with respect to the cited art.

Schilling et al., Horner et al., Borkowicz et al., and Joshi et al. are all described above. Talabisco et al. describe a method and apparatus for maintaining a constant level of NO_x and minimizing CO emissions from a gas turbine. The turbine includes a compressor 12 and a combustor 14. Fuel, air, and steam is injected into combustor 14 based on a load of the turbine.

Maslak describes water and steam injection in a cogeneration system 10. System 10 includes a gas turbine 11 including a compressor 12 and a combustor

18. Water and steam are injected based on gas turbine power output.

Claim 5 depends from Independent Claim 1 which recites a method for operating a gas turbine combustor using a water delivery system, the combustor including a plurality of domes, the water delivery system is connected to the gas turbine engine, and the method comprising the steps of "operating the gas turbine engine with a combustor including a plurality of domes and with a combustor fuel/air mixture equivalence ratio less than one...supplying at least one of water and steam into the gas turbine engine with the water delivery system...."

None of Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., Maslak, or Joshi et al., considered alone or in combination, describe or suggest a method for operating a gas turbine combustor using a water delivery system, wherein the combustor includes a plurality of domes, and wherein the water delivery system is connected to the gas turbine engine, in combination with method steps of operating the gas turbine engine with a combustor that includes a plurality of domes and with a combustor fuel/air mixture equivalence ratio less than one, and supplying

at least one of water and steam into the gas turbine engine with the water delivery system. Specifically, none of Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., nor Masklak, considered alone or in combination, describe or suggest operating a combustor with a fuel/air mixture equivalence ratio less than one, and when Schilling et al., Horner et al., Borkowicz et al. and Talabisco et al. or Maslak, are considered in combination with Joshi et al., none of Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., Maslak, nor Joshi et al., describe or suggest water injection in a combustor that is operable with a fuel/air mixture equivalence ratio less than one. Furthermore, Joshi et al. teach away from Horner et al., Borkowicz et al., Talabisco et al., and Maslak, by describing a combustor that is specifically not operable with water injection. Accordingly, Applicants respectfully submit that Claim 1 is patentable over Schilling et al. in view of Horner et al. or Borkowicz et al. and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Claim 5 depends from independent Claim 1 and further recites the gas turbine engine has a rated engine operating capability, said step of supplying at

least one of water and steam further comprises the step of "supplying at least one of water and steam to the gas turbine engine when the engine is operating at an operating speed greater than approximately 90 percent rated engine power capability." Applicants submit that when this structure is considered in combination with the structure recited in Claim 1, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 5 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Claims 12 and 13 depend from Independent Claim 6 which recites a combustor system for a gas turbine engine, wherein the combustor system comprises "a combustor comprising a plurality of domes, at least one of said combustor domes configured to operate with a fuel/air mixture equivalence ratio less than one...water delivery sub-system connected to the gas turbine engine and configured to supply at least one of

water and steam to the gas turbine such that at least one of water and steam is injected into the combustor."

None of Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., Maslak, or Joshi et al., considered alone or in combination, describe nor suggest a combustor system for a gas turbine engine, wherein the combustor system includes a combustor including a plurality of domes, wherein at least one of the combustor domes is configured to operate with a fuel/air mixture equivalence ratio less than one, in combination a water delivery sub-system connected to the gas turbine engine and configured to supply at least one of water and steam to the gas turbine such that at least one of water and steam is injected into the combustor. Specifically, none of Schilling et al., Horner et al., Borkowicz et al. nor Talabisco et al. or Maslak, considered alone or in combination, describe or suggest a combustor system for a gas turbine engine including a combustor dome that is configured to operate with a fuel/air mixture equivalence ratio less than one, and when Schilling et al., Horner et al., and Borkowicz et al., and Talabisco et al. or Maslak, are considered in combination with Joshi et al., none of

Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., Maslak, nor Joshi et al., describe or suggest water injection in a combustor that is operable with a fuel/air mixture equivalence ratio less than one. Furthermore, Joshi et al. teach away from Horner et al., Borkowicz et al., Talabisco et al., and Maslak, by describing a combustor that is specifically not operable with water injection. Accordingly, Applicants respectfully submit that Claim 6 is patentable over Schilling et al. in view of Horner et al. or Borkowicz et al. and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Claim 12 depends from independent Claim 6 and further recites "said water delivery sub-system (130) selectively operable in a first mode and a second mode, said water delivery sub-system further configured to supply water to said combustor at a first flow rate when in the first operating mode, said water delivery sub-system further configured to supply water to said combustor at a higher flow rate when in the second operating mode." Applicants submit that when this structure is considered in combination with the structure recited in Claim 6, the structure is not taught nor suggested by Schilling et al. in view of

Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 12 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Claim 13 depends from Claim 12 and further recites the engine has a rated engine power, "said water delivery sub-system is further configured to supply water in the first operating mode when the gas turbine engine operates below a predefined percentage of the rated engine power and supply water in the second operating mode when the gas turbine engine operates above the predefined percentage of the rated engine power. Applicants submit that when this structure is considered in combination with the structure recited in Claim 6, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 13 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further

in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Independent Claim 14 recites a gas turbine engine comprising a combustor system comprising a combustor and a water delivery sub-system...said combustor being a lean premix combustor comprising a plurality of domes...at least one of said domes configured to operate with a fuel/air mixture equivalence ratio less than one...said water delivery sub-system configured to supply at least one of water and steam to the gas turbine engine such that at least one of water and steam is injected into the combustor."

None of Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., Maslak, or Joshi et al., considered alone or in combination, describe or suggest a gas turbine engine including a combustor system including a combustor that includes a combustor and a water delivery sub-system, wherein the combustor includes a plurality of domes such that at least one of the domes is configured to operate with a fuel/air mixture equivalence ratio less than one, in combination with a water delivery sub-system configured to supply at least one of water and steam to the gas turbine

engine such that at least one of water and steam is injected into the combustor. Specifically, none of Schilling et al., Horner et al., Borkowicz et al. nor Talabisco et al. nor Maslak, considered alone or in combination, describe or suggest operating a combustor with a fuel/air mixture equivalence ratio less than one, and when Schilling et al., Horner et al., Borkowicz et al., and Talabisco et al. or Maslak, are considered in combination with Joshi et al., none of Schilling et al., Horner et al., Borkowicz et al., Talabisco et al., Maslak, nor Joshi et al., describe or suggest water injection in a combustor that is operable with a fuel/air mixture equivalence ratio less than one. Furthermore, Joshi et al., teach away from Horner et al., Borkowicz et al., Talabisco et al., and Maslak, by describing a combustor that is specifically not operable with water injection. Accordingly, Applicants respectfully submit that Claim 14 is patentable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. and Maslak, and further in view of Joshi et al.

Claim 18 depends from Claim 14 and further recites "said water delivery sub-system selectively operable in

a first mode and a second mode, said water delivery sub-system further configured to supply water to said combustor at a first flow rate when in the first operating mode, said water delivery sub-system further configured to supply water to said combustor at a higher flow rate when in the second operating mode." Applicants submit that when this structure is considered in combination with the structure recited in Claim 14, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 18 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Claim 19 depends from Claim 18 and further recites said gas turbine engine has a rated engine power capability, said water delivery sub-system further configured to supply water in the first operating mode when the gas turbine engine operates below a predefined percentage of the rated engine power and supply water

in the second operating mode when the gas turbine engine operates above the predefined percentage of the rated engine power." Applicants submit that when this structure is considered in combination with the structure recited in Claim 14, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al., and accordingly, Applicants submit that dependent Claim 19 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Claim 20 depends from Claim 19 and further recites said water delivery sub-system further configured to supply water in the second operating mode when said gas turbine engine is operating at an operating speed greater than approximately 90 percent rated engine power capability. Applicants submit that when this structure is considered in combination with the structure recited in Claim 14, the structure is not taught nor suggested by Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of

Joshi et al., and accordingly, Applicants submit that dependent Claim 20 is patentably distinguishable over Schilling et al. in view of Horner et al. or Borkowicz et al., and further in view of Talabisco et al. or Maslak, and further in view of Joshi et al.

Accordingly, Applicants respectfully submit that the Section 103 rejection of Claims 5, 12-14, and 18-20 should be withdrawn.

As all the pending Claims are believed to be patentable over the cited are and in condition for allowance, favorable action is respectfully solicited.

Respectfully submitted,

Robert B. Reeser III
Reg. No. 45,548
ARMSTRONG TEASDALE LLP.
One Metropolitan Square, Ste 2600
St. Louis, Missouri 63102-2740
(314) 621-5070

APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

1. A method for operating a gas turbine combustor of a gas turbine engine using a water delivery system, the combustor including a plurality of domes, the water delivery system connected to the gas turbine engine, said method comprising the steps of:

supplying at least one combustor dome a fuel/air mixture equivalence ratio less than one; and

supplying at least one of water and steam into the gas turbine engine with the water delivery system such that at least one of water and steam is injected into the combustor.

2. A method in accordance with Claim 1 wherein said step of supplying at least one of water and steam further comprising the step of supplying at least one of water and steam to at least one of the plurality of domes.

3. A method in accordance with Claim 1 wherein the combustor includes a first dome, a second dome, and a third dome, the second dome disposed radially inward from the first dome and the third dome, said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam to the combustor second dome.

4. A method in accordance with Claim 1 wherein the combustor includes at least one dual fuel nozzle, said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam to the combustor through at least one dual fuel nozzle.

5. A method in accordance with Claim 1 wherein the gas turbine engine has a rated engine operating capability, said step of supplying at least one of water and steam further comprises the step of supplying at least one of water and steam to the gas turbine engine when the engine is operating at an operating speed greater than approximately 90 percent rated engine power capability.

6. A combustor system for a gas turbine engine, said combustor system comprising: a combustor comprising a plurality of domes, at least one of said combustor domes configured to operate with a fuel/air mixture equivalence ratio less than one; and a water delivery sub-system connected to the gas turbine engine and configured to supply at least one of water and steam to the gas turbine such that at least one of water and steam is injected into the combustor.

8. A combustor system in accordance with Claim 6 wherein said water delivery sub-system further configured to

supply at least one of water and steam to at least one dome of said combustor.

9. A combustor system in accordance with Claim 8 wherein said combustor further comprises at least one dual fuel nozzle, said water delivery sub-system further configured to supply at least one of water and steam to said combustor through at least one dual fuel nozzle.

10. A combustor system in accordance with Claim 8 wherein said combustor further comprises at least one premixer in flow communication with said water delivery sub-system.

11. A combustor system in accordance with Claim 6 wherein said combustor comprises a first dome, a second dome, and a third dome, said second dome disposed between said first and third domes, said water delivery sub-system further configured to supply at least one of water and steam to said combustor second dome.

12. A combustor system in accordance with Claim 6 wherein said water delivery sub-system selectively operable in a first mode and a second mode, said water delivery sub-system further configured to supply water to said combustor at a first flow rate when in the first operating mode, said water delivery sub-system further configured to supply water

to said combustor at a higher flow rate when in the second operating mode.

13. A combustor system in accordance with Claim 12 wherein the engine has a rated engine power, said water delivery sub-system is further configured to supply water in the first operating mode when the gas turbine engine operates below a predefined percentage of the rated engine power and supply water in the second operating mode when the gas turbine engine operates above the predefined percentage of the rated engine power.

14. A gas turbine engine comprising a combustor system comprising a combustor and a water delivery sub-system, said combustor being a lean premix combustor comprising a plurality of domes, at least one of said domes configured to operate with a fuel/air mixture equivalence ratio less than one, said water delivery sub-system configured to supply at least one of water and steam to the gas turbine engine such that at least one of water and steam is injected into the combustor.

15. A gas turbine engine in accordance with Claim 14 wherein said combustor comprises at least one premixer, said water delivery sub-system further configured to supply at least one of water and steam to at least one premixer of said combustor.

16. A gas turbine engine in accordance with Claim 14 wherein said water delivery sub-system further configured to supply at least one of water and steam to at least one dome of said combustor.

17. A gas turbine engine in accordance with Claim 16 wherein said combustor further comprises a first dome, a second dome, and a third dome, said second dome disposed between said first and third domes, said water delivery sub-system further configured to supply at least one of water and steam to said combustor second dome.

18. A gas turbine engine in accordance with Claim 14 wherein said water delivery sub-system selectively operable in a first mode and a second mode, said water delivery sub-system further configured to supply water to said combustor at a first flow rate when in the first operating mode, said water delivery sub-system further configured to supply water to said combustor at a higher flow rate when in the second operating mode.

19. A gas turbine engine in accordance with Claim 18 wherein said gas turbine engine has a rated engine power capability, said water delivery sub-system further configured to supply water in the first operating mode when the gas turbine engine operates below a predefined percentage of the rated engine power and supply water in the

second operating mode when the gas turbine engine operates above the predefined percentage of the rated engine power.

20. A gas turbine engine in accordance 19 wherein said water delivery sub-system further configured to supply water in the second operating mode when said gas turbine engine is operating at an operating speed greater than approximately 90 percent rated engine power capability.